



Next Steps

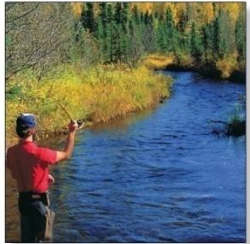
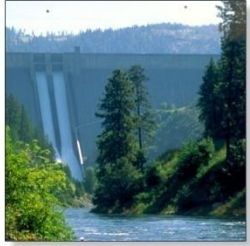
Presented by Allan Wylie IDWR

5 December 2013



Outline

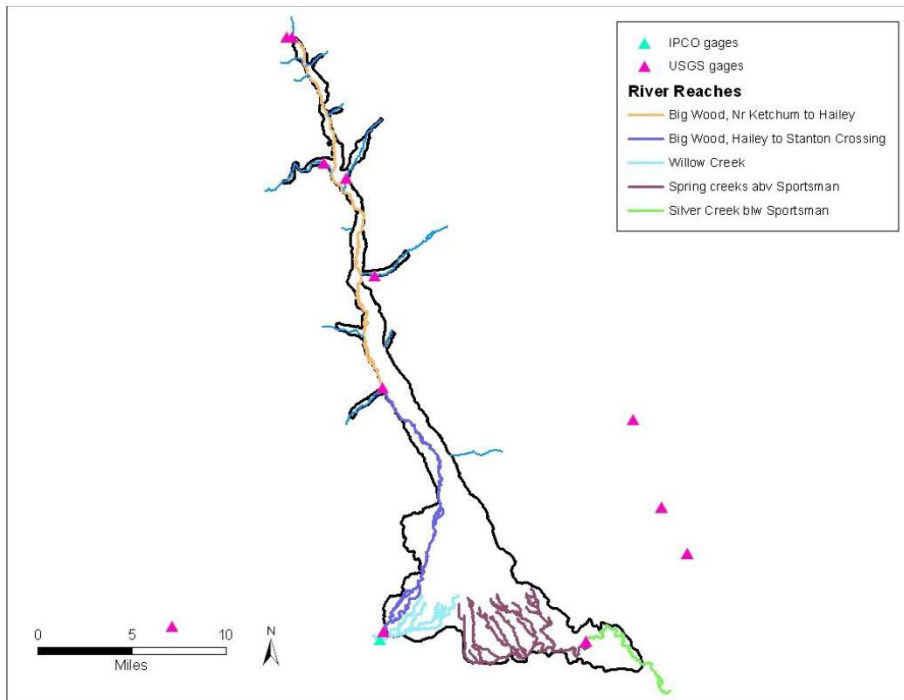
- Introduction
- Calibration Targets
- Adjustable Parameters
- Process



Calibration Targets

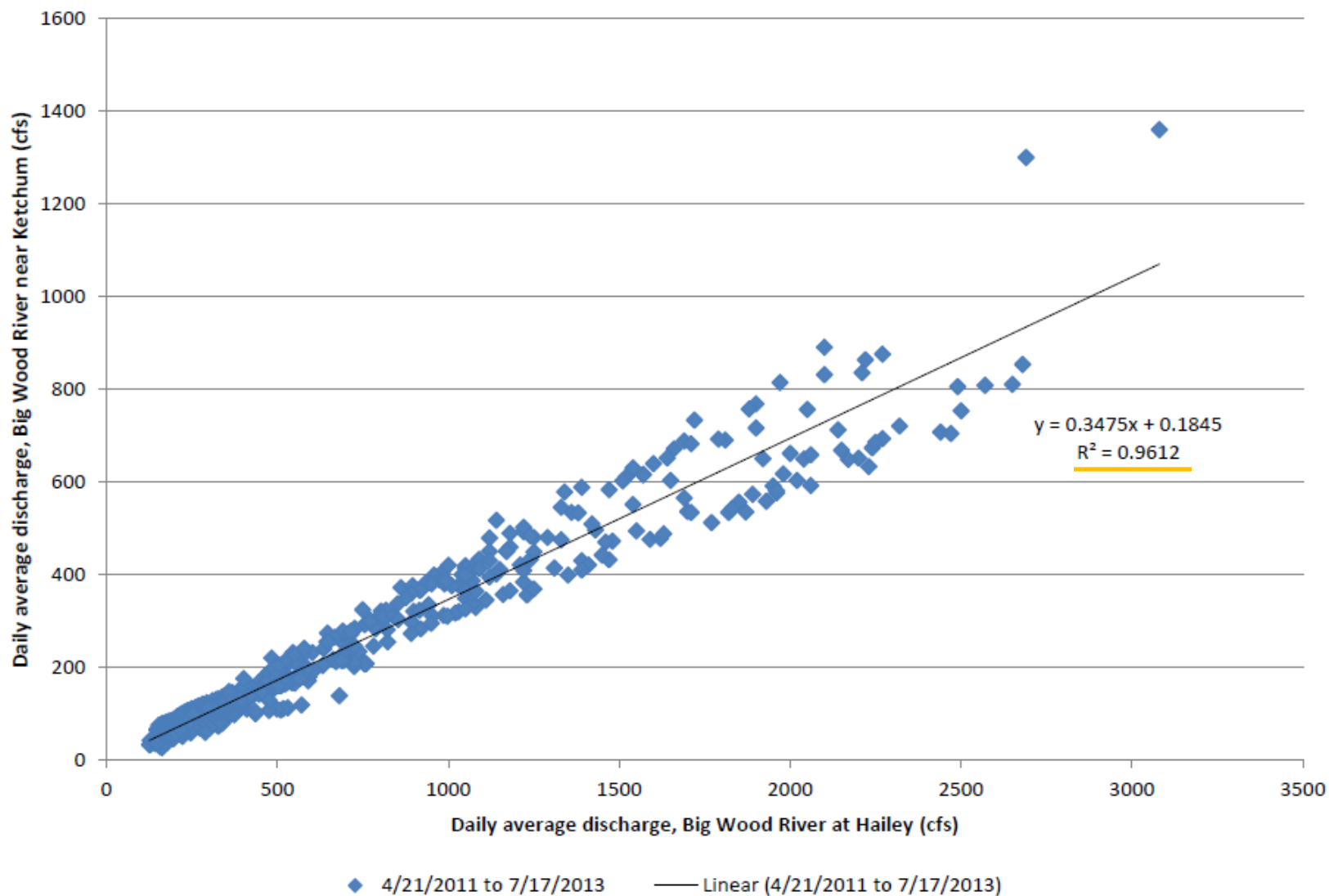
- River gains
 - Big Wood River
 - Silver Creek
 - Willow Creek
- Water levels in wells
- Underflow out of the model

River gains

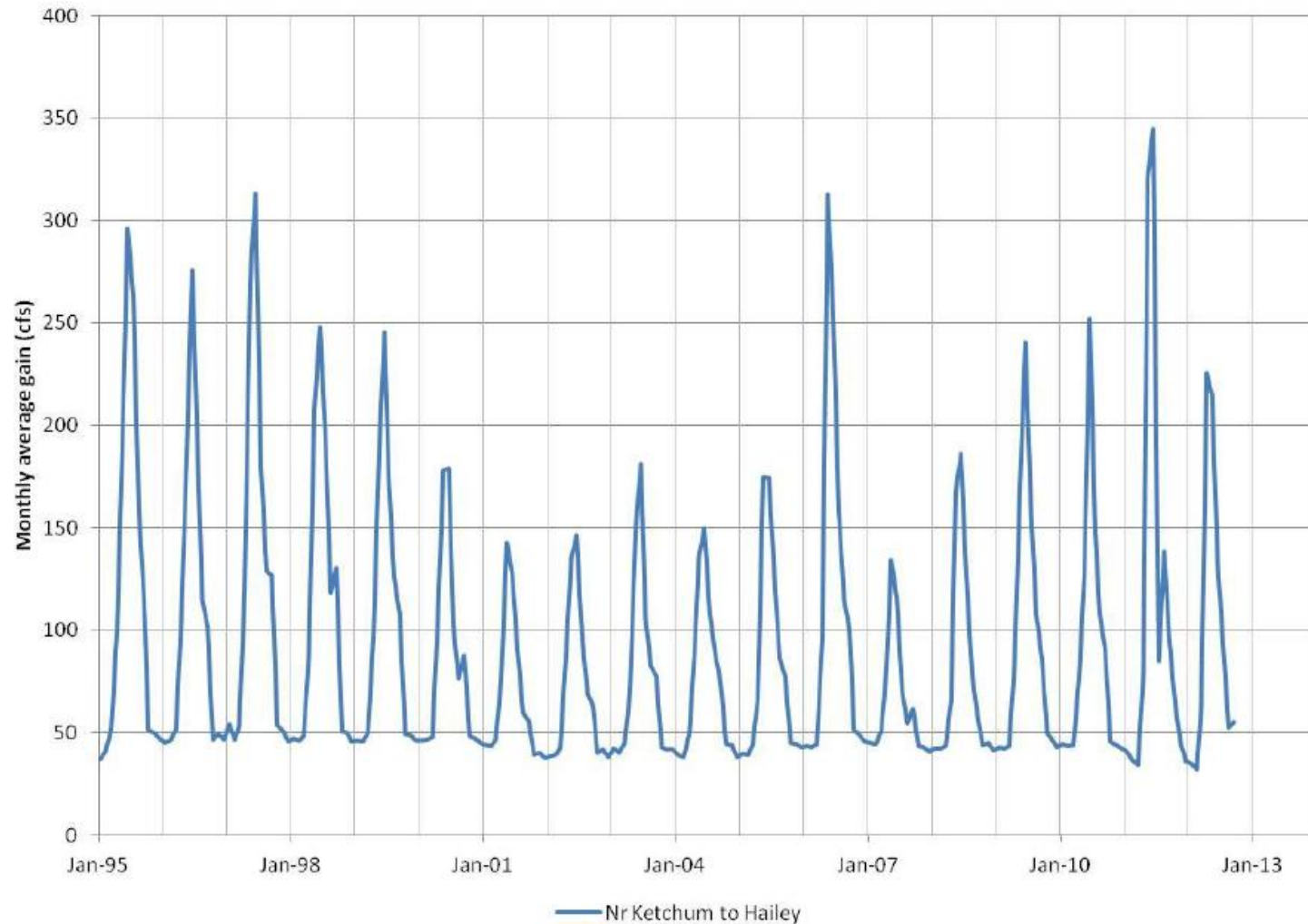


- Continuous stations
 - Big Wood nr Ketchum
 - 4/2011 – present
 - Big Wood River at Hailey
 - 7/1915 – present
 - Big Wood River at Stanton Crossing
 - 9/1996 – present
 - Silver Cr at Sportsman Access
 - 10/1974 – 9/2006
 - 10/2007 – present
 - Willow Cr
 - 6/2006 - present
- Seepage runs
 - August 2012
 - October 2012
 - March 2013

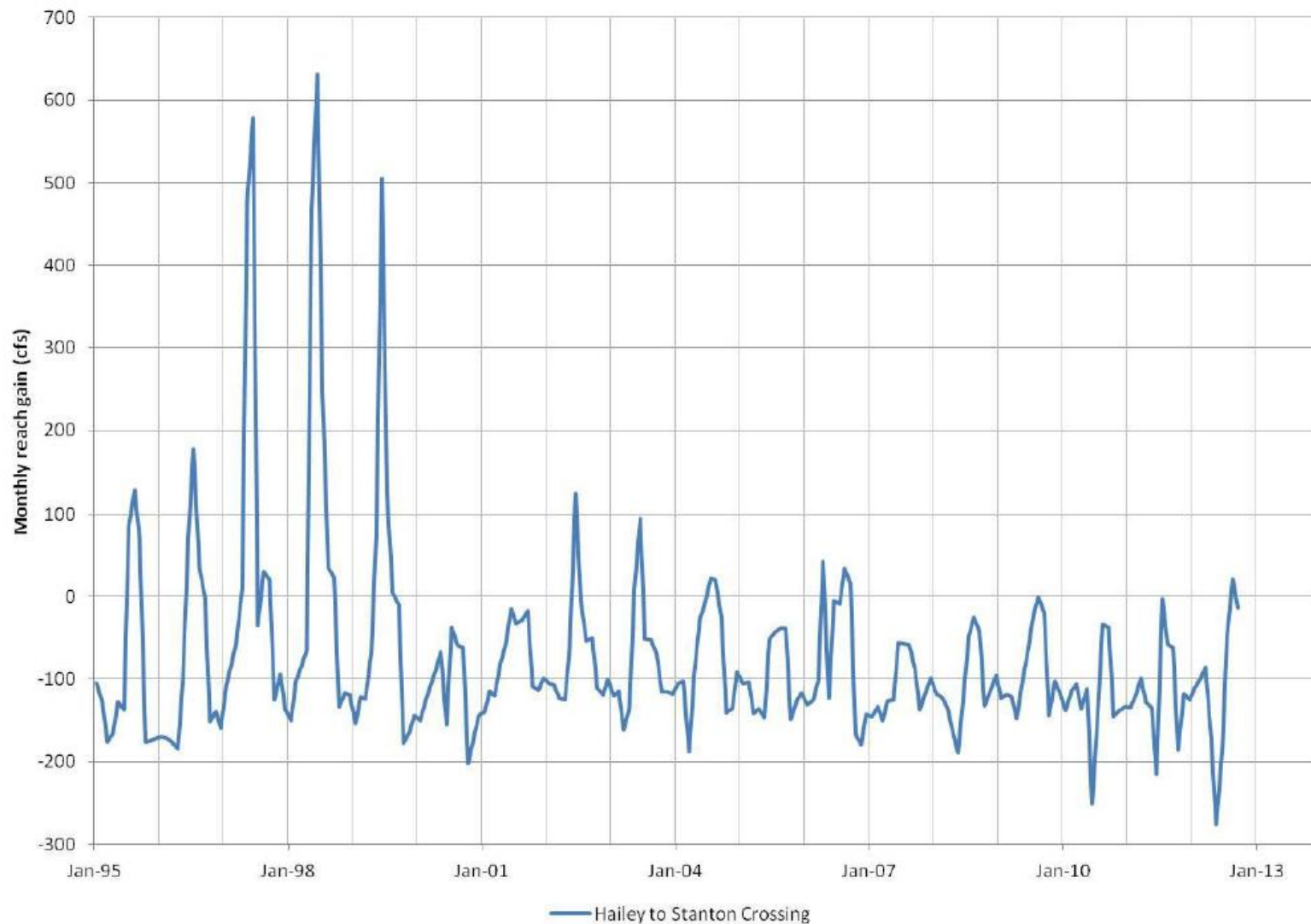
Near Ketchum vs. Hailey gage readings, 4/2011 - 7/2013



Nr Ketchum to Hailey reach gain (includes runoff from smaller tributaries)



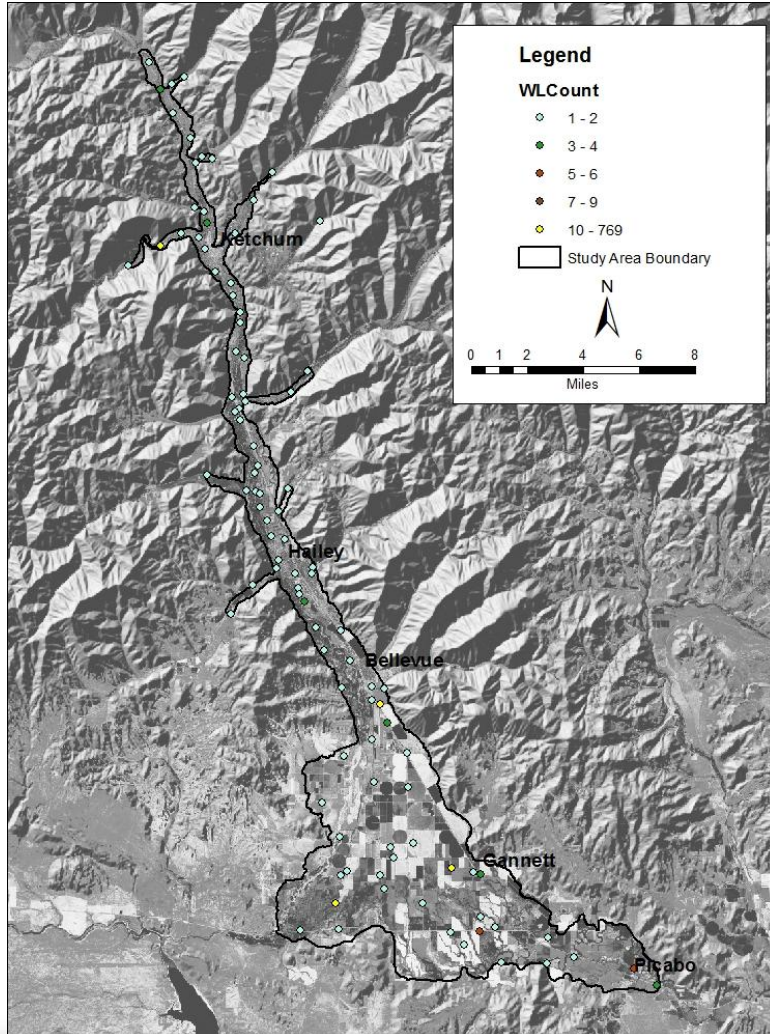
Hailey to Stanton Crossing (includes smaller tributaries)



Flow in Big Wood River

- With the stream flow routing package flow in the river can be used as a calibration target
- Possible additional targets could include making sure that the river is dry in the appropriate places at the appropriate times
 - Dry is not a continuous function
 - More on this later

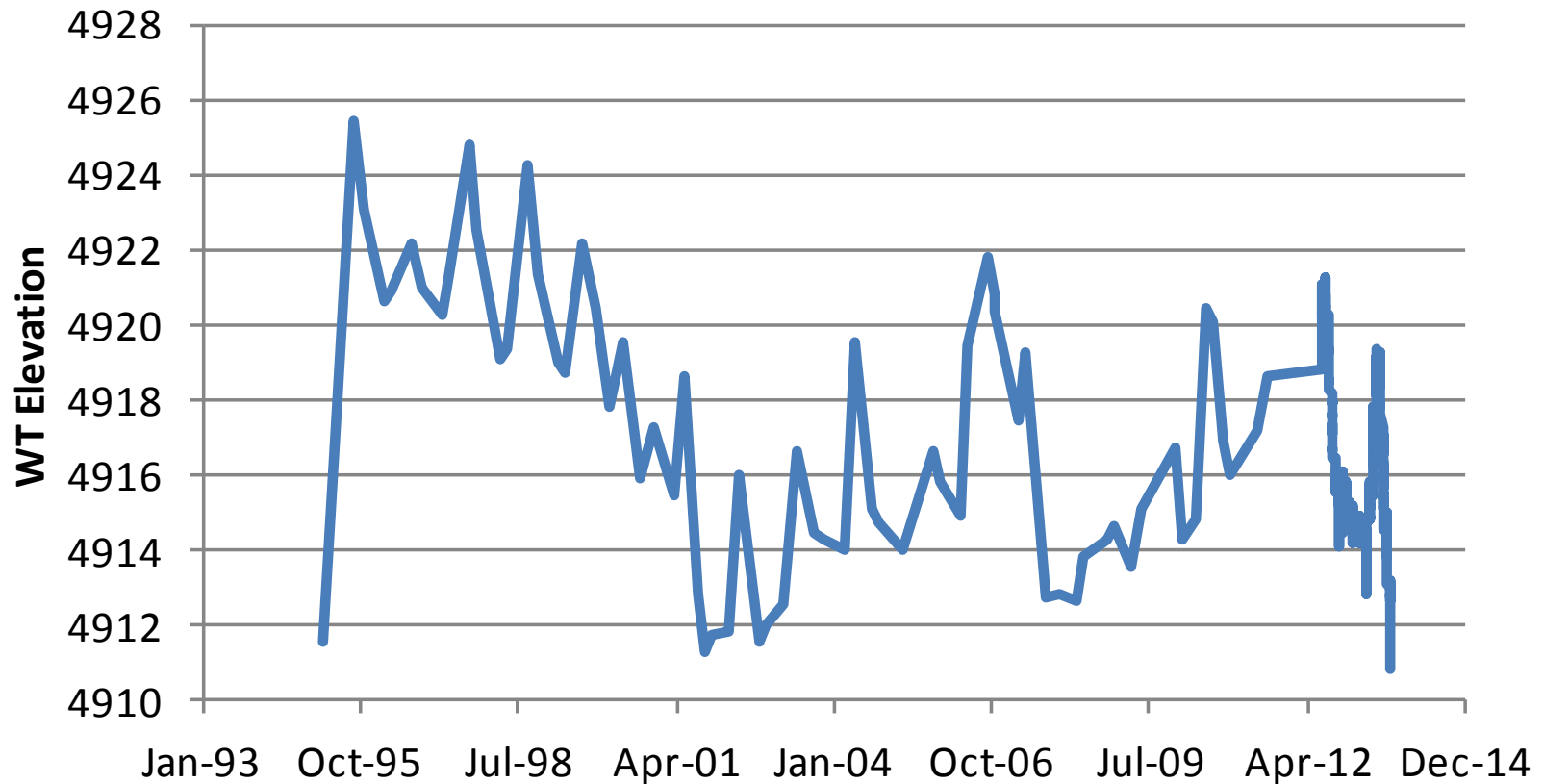
Water levels in wells



- Most wells don't have many measurements during the calibration period

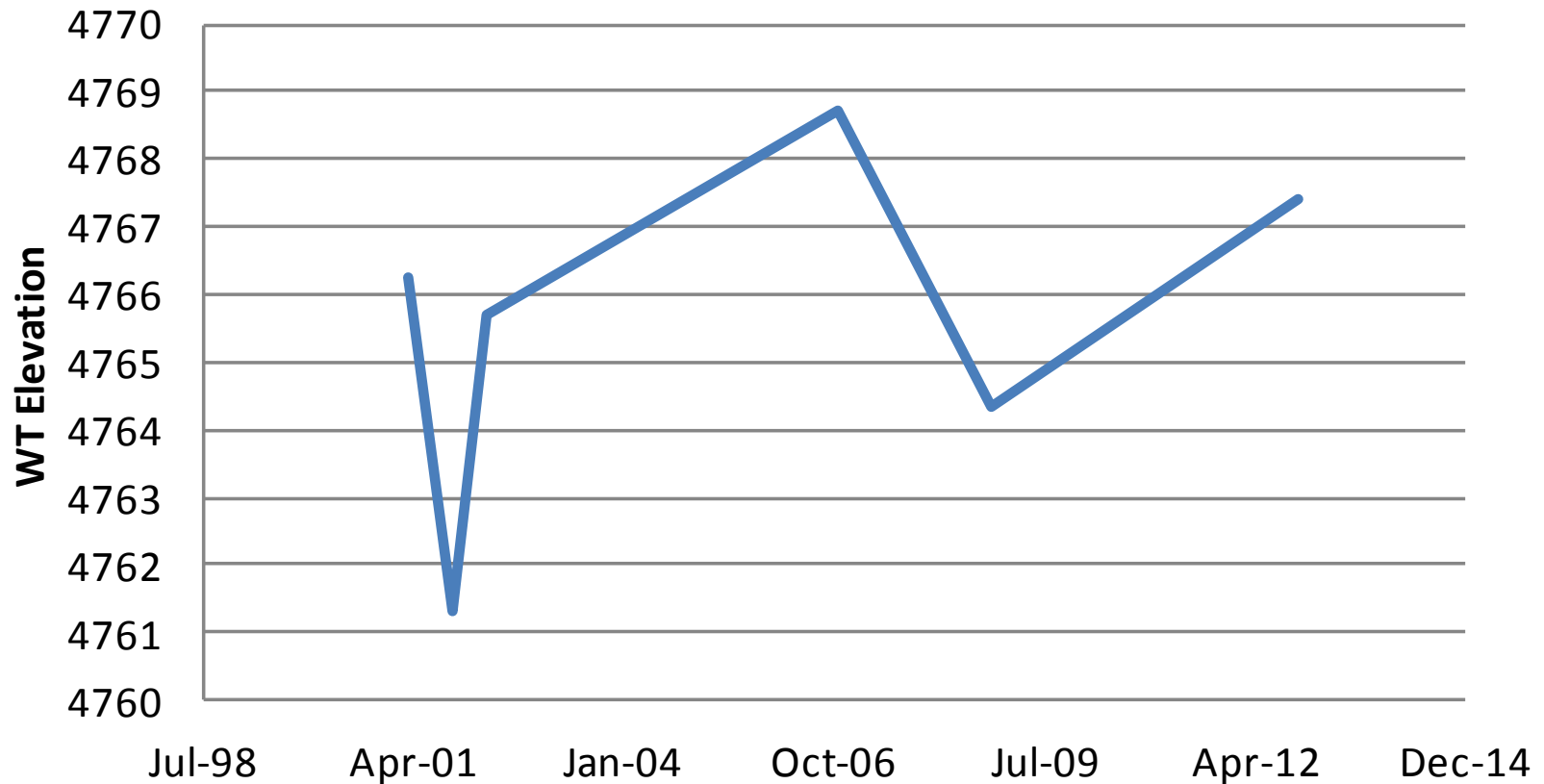


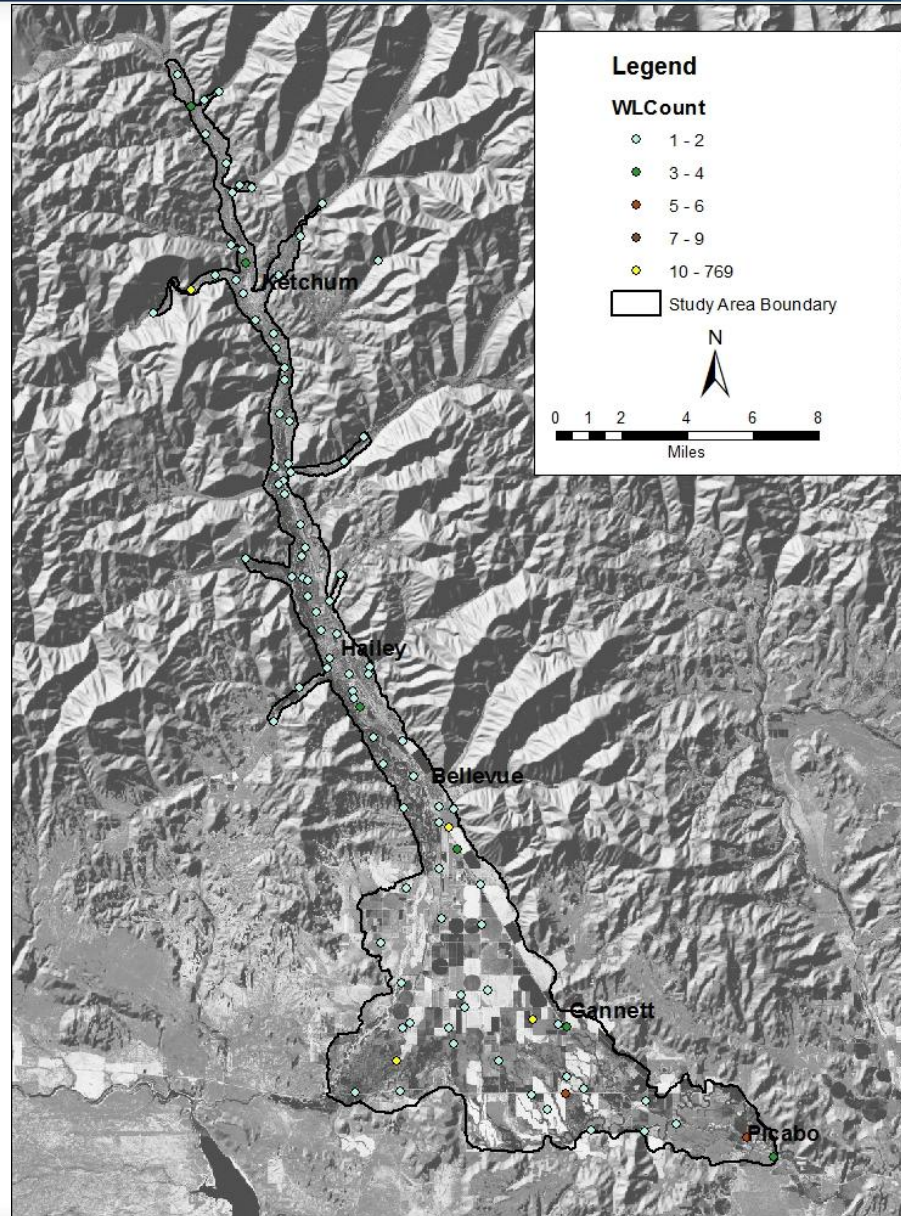
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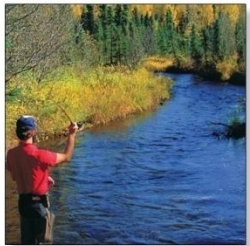
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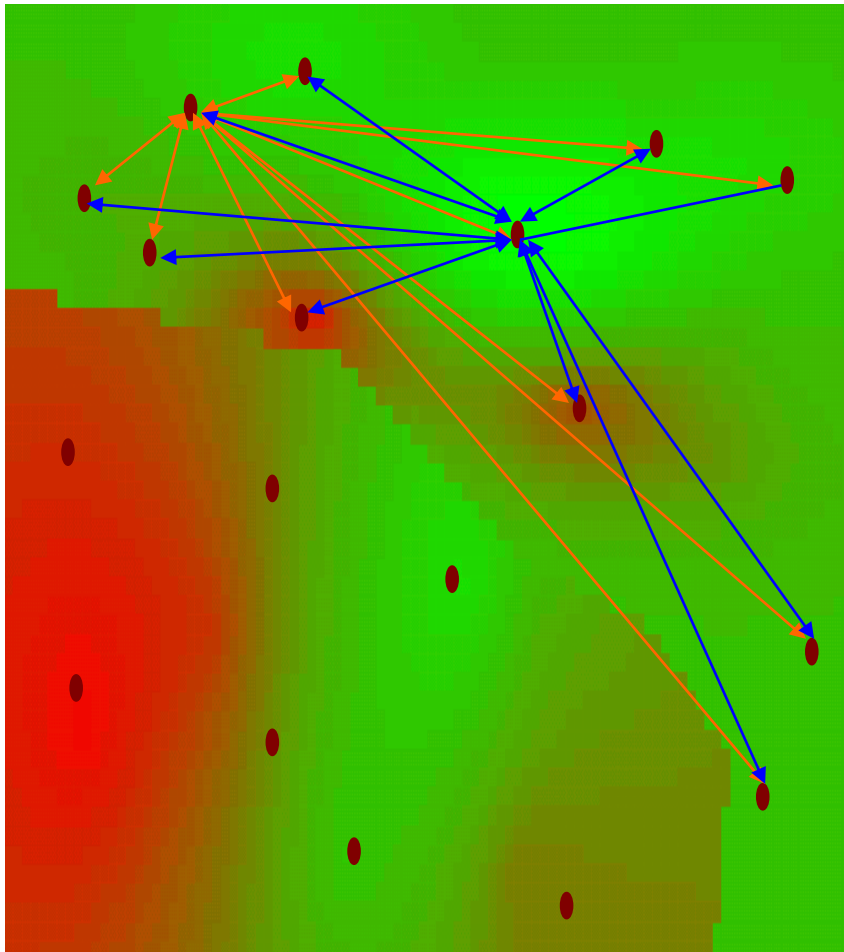


Adjustable Parameters

- Aquifer properties
 - Hydraulic conductivity
 - Pilot points
 - Specific yield
 - Pilot points
 - Riverbed conductance
 - Drain conductance
- Components of water budget
 - ET
 - By irrigation entity
 - Tributary inflow
 - By tributary valley
 - Canal seepage
 - By irrigation entity

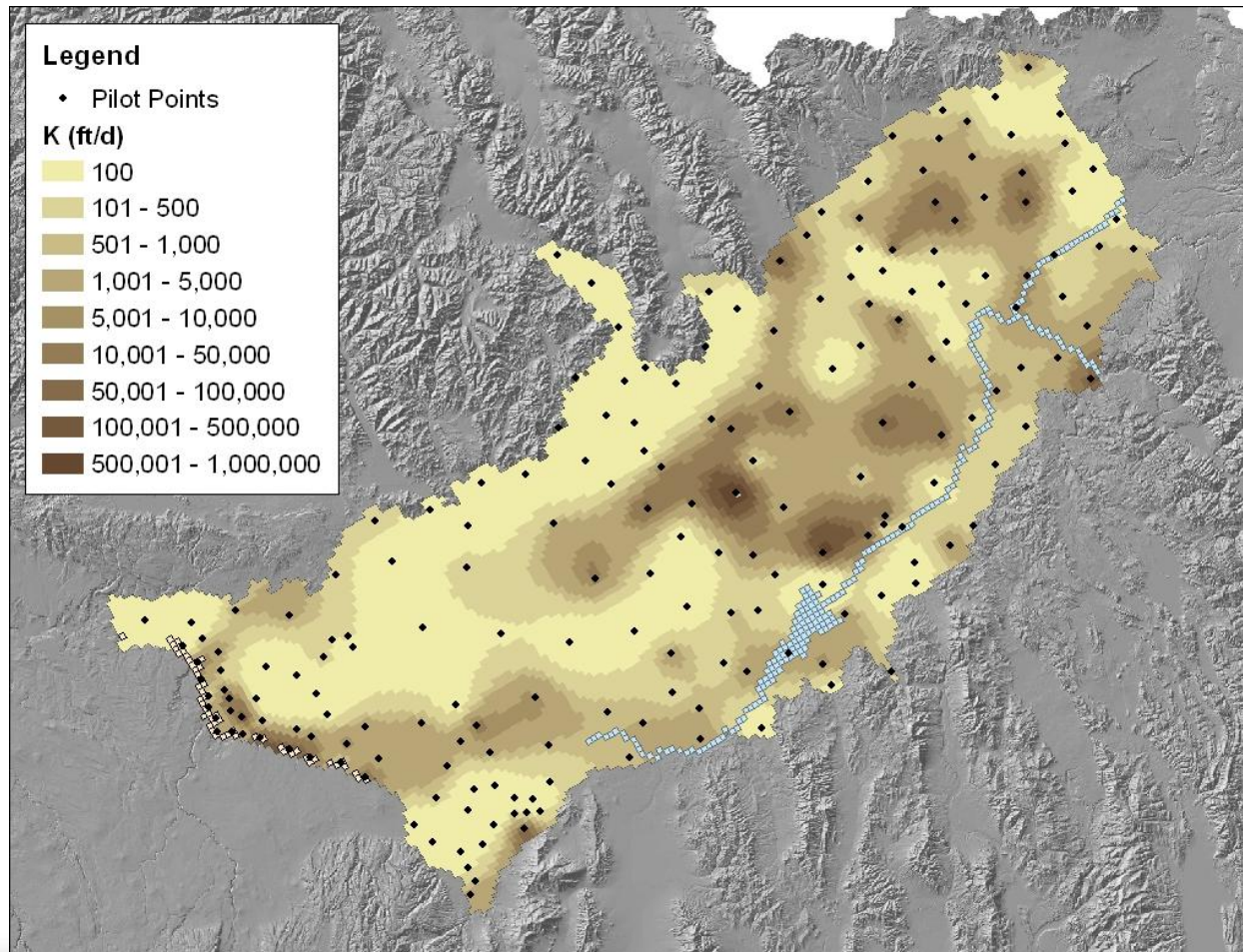


Pilot Points



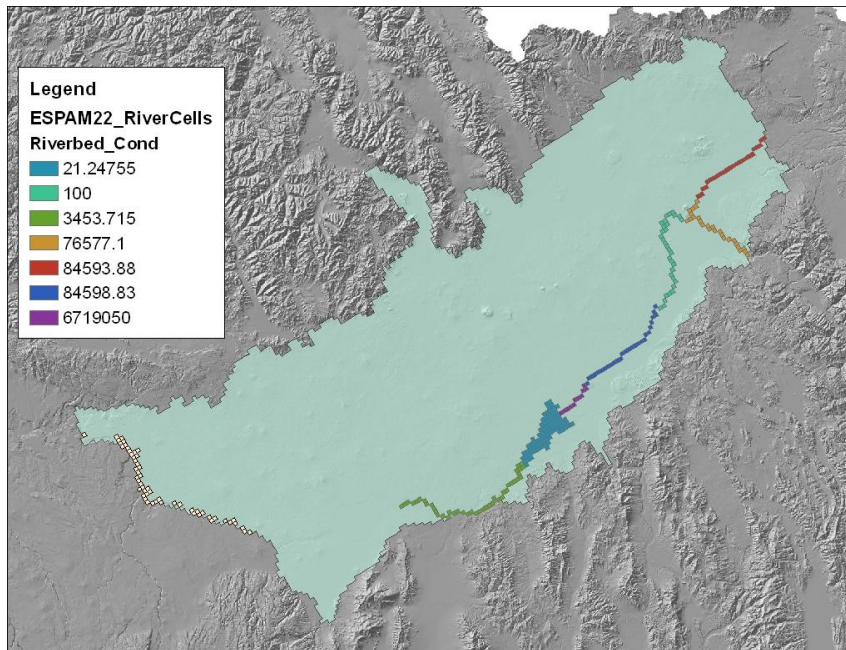
- Estimate hydraulic conductivity (K) or specific yield (SY) at pilot points
- Interpolate values between pilot points

Pilot Points

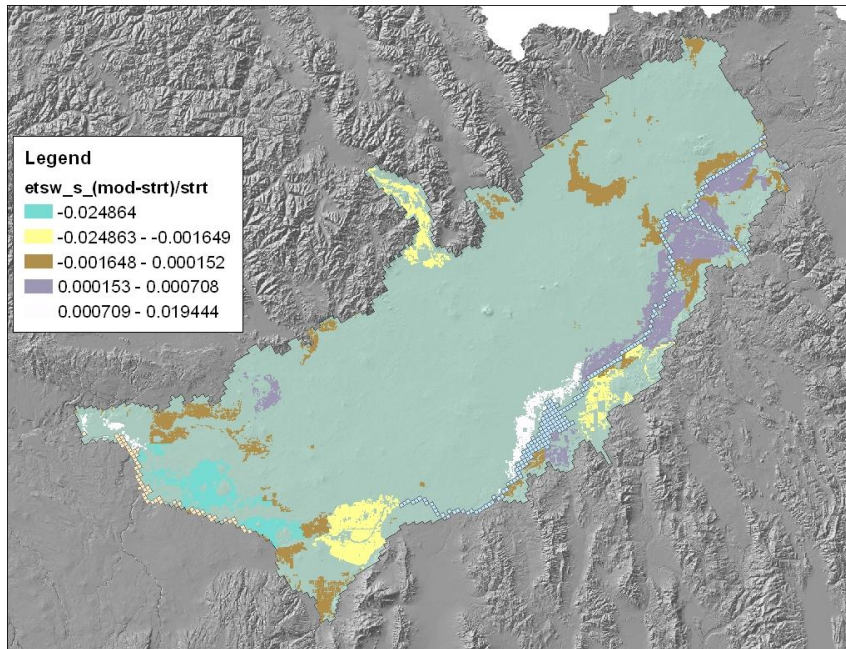


Riverbed Conductance (RBC)

- Assign RBC by reach

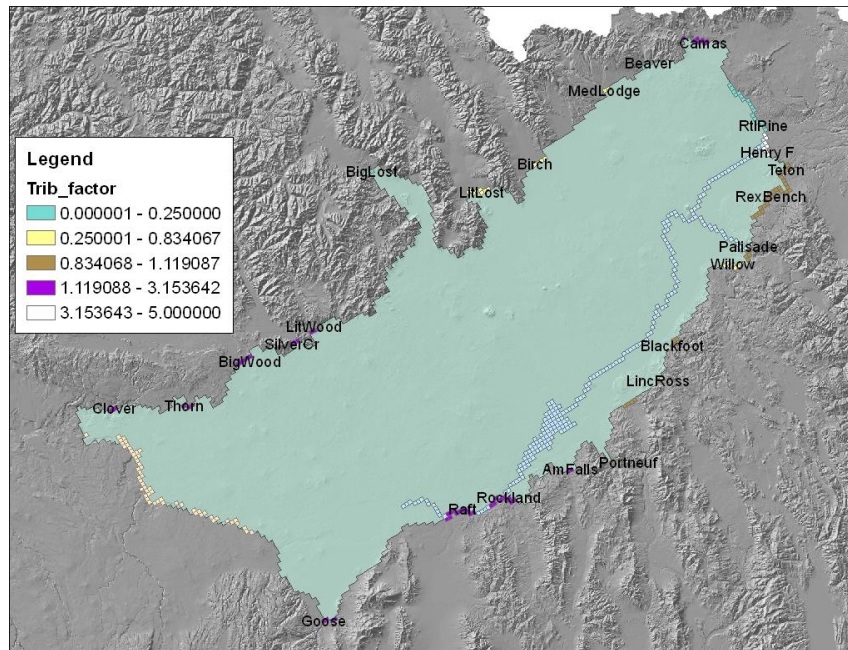


Evapotranspiration (ET)



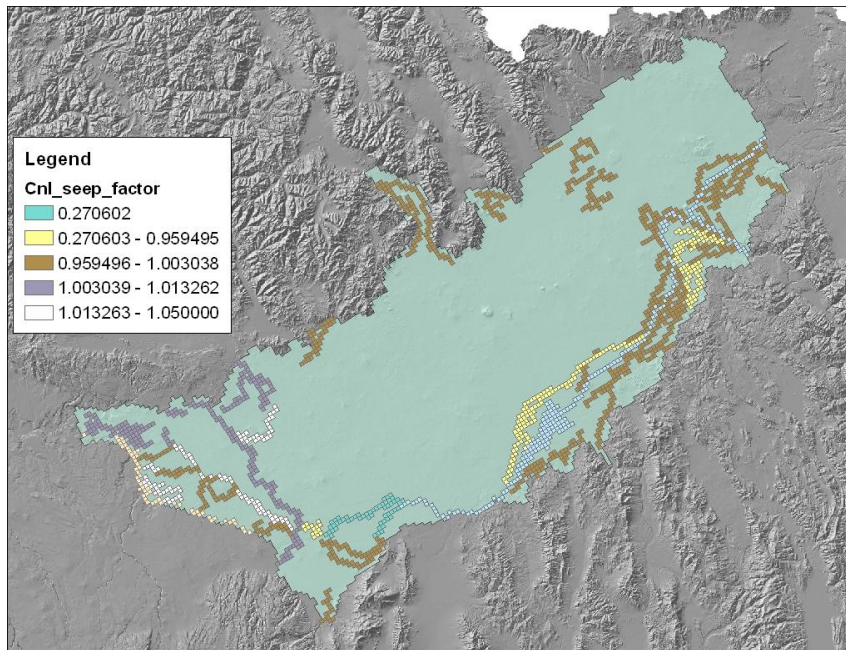
- Assign ET adjustment factors by entity
– $(\text{model-start})/\text{start}$

Tributary valley inflow (TRB)



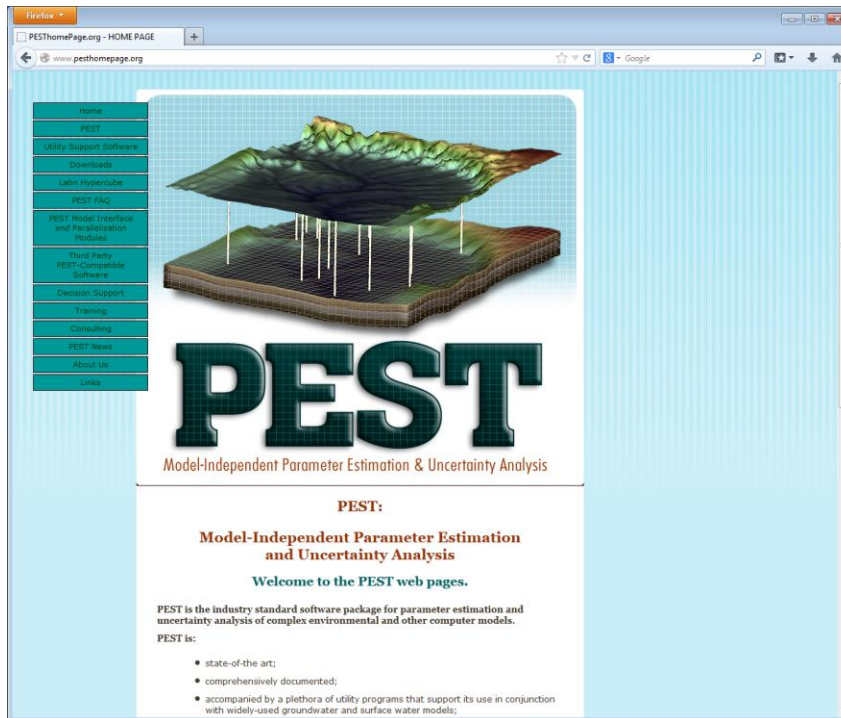
- Assign TRB adjustment tributary valley

Canal Seepage (CNL)



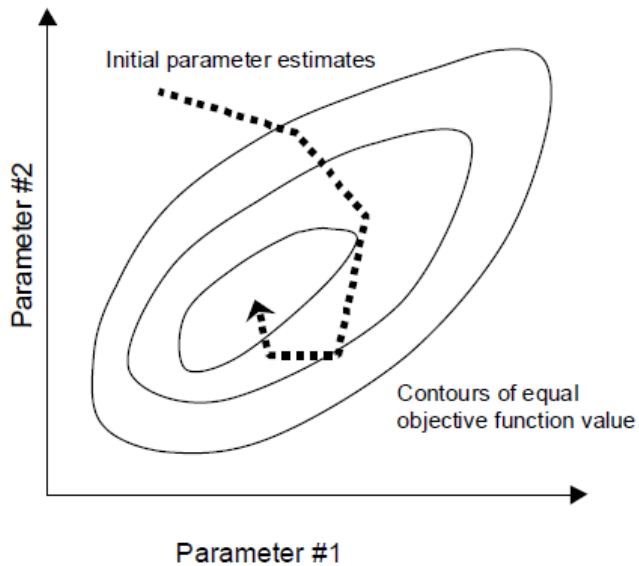
- Assign CNL adjustment factors by entity

PEST



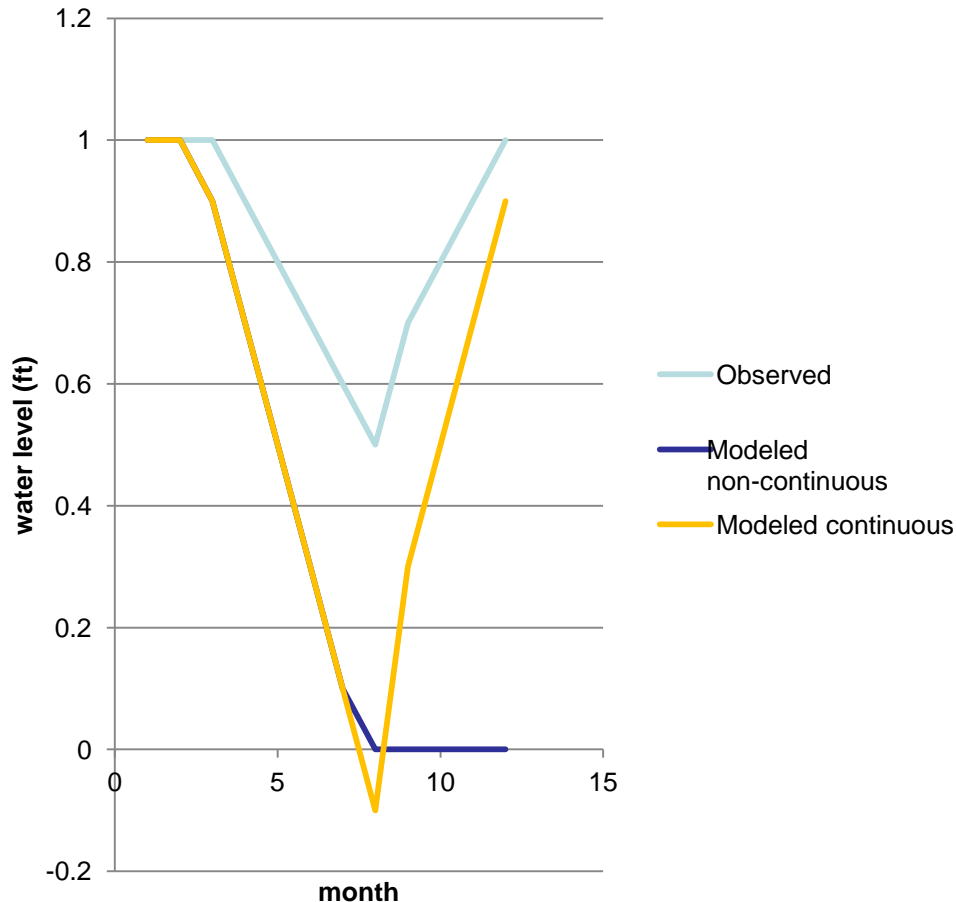
- Parameter ESTimation software (PEST)
'<http://www.pesthomepage.org/>'
- PEST is the industry standard software package for parameter estimation and uncertainty analysis of complex environmental and other computer models.
- PEST does not have a Graphical User Interface (GUI), it works from the command line.

PEST



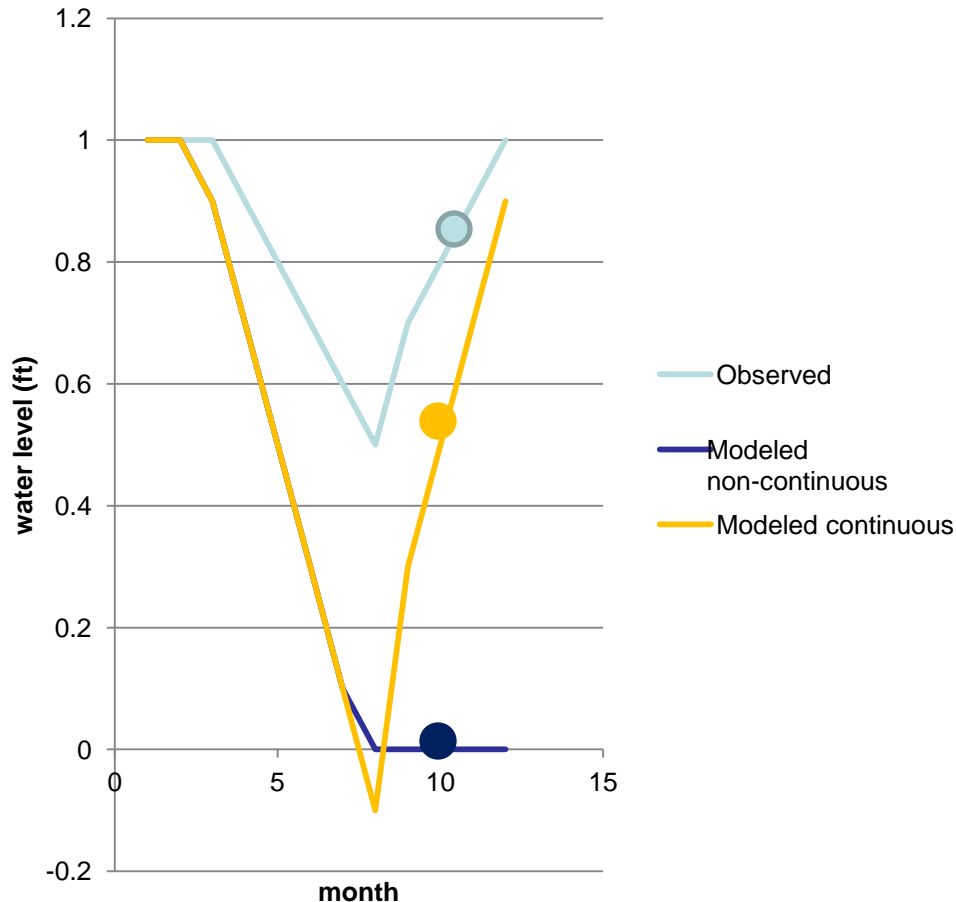
- Simple 2 parameter model
- Populate jacobian matrix
 - Adjust each parameter record impact of adjustment on every observation
- Calculate upgrade vector
- Move down upgrade vector comparing model output with field observations
- When match stops improving, stop and repopulate jacobian matrix
- etc

PEST



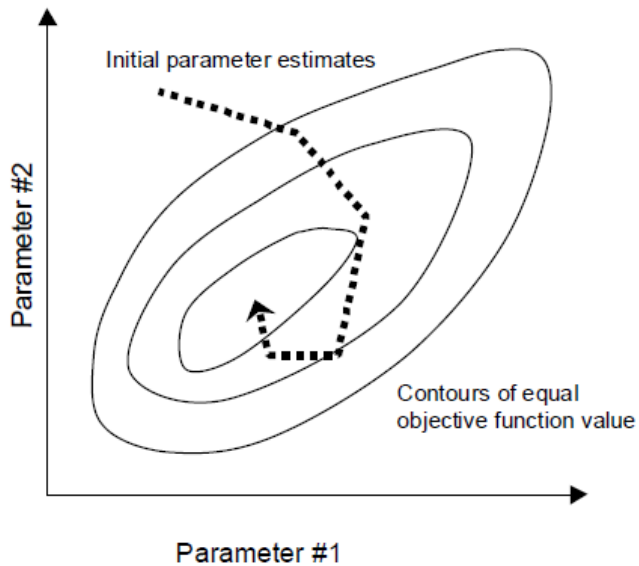
- Jacobian matrix
 - Change between model output and field observations with respect to change in model parameters
- Best if model output is continuous
 - i.e. decrease non-irrigated recharge results in lower water levels at well X
 - What if well goes dry?
 - Results in non-continuous output?
 - Wells actually go dry
 - What value do we hand to PEST?

PEST



- Jacobian matrix
 - Change between model output and field observations with respect to change in model parameters
- Best if function is continuous
 - i.e. decrease non-irrigated recharge results in lower water levels at well X
 - What if well goes dry?
 - Results in non-continuous output?
 - Wells actually go dry
 - What value do we hand to PEST?

PEST



- Populate jacobian matrix using fixed transmissivity model
 - Wells can not go dry
- Calculate upgrade vector using jacobian populated with fixed transmissivity model
- Evaluate upgrade vector using variable transmissivity model
 - Wells can go dry

Conclusions

- Calibration Targets
 - River gains and losses
 - Flow in river
 - Water levels in wells
 - Outflow from model
- Adjustable Parameters
 - Hydraulic conductivity (K)
 - Specific yield (Sy)
 - Riverbed conductance (RBC)
 - Drain conductance (DC)
 - Evapotranspiration adjustment factor (ET)
 - Tributary inflow adjustment factor (TRB)
 - Canal seepage factor (CNL)

